

SUPER SCIENCE: THE GENETICS BEHIND SUPERHEROES

THE UCSF/UCB IGEM TEAM

CAPTAIN AMERICA

SUPER SOLDIER

Super Power: **SUPER STRENGTH AND ENDURANCE**

Origin: **USA SUPER SOLDIER EXPERIMENT**

Our Assessment: **SUPER UNLIKELY**
ENDURANCE GENE FOUND IN MANY
OLYMPIANS +
INCREASE IN TESTOSTERONE =
SLIGHTLY SUPERHUMAN
CHARACTERISTICS





THE AMAZING SPIDER-MAN

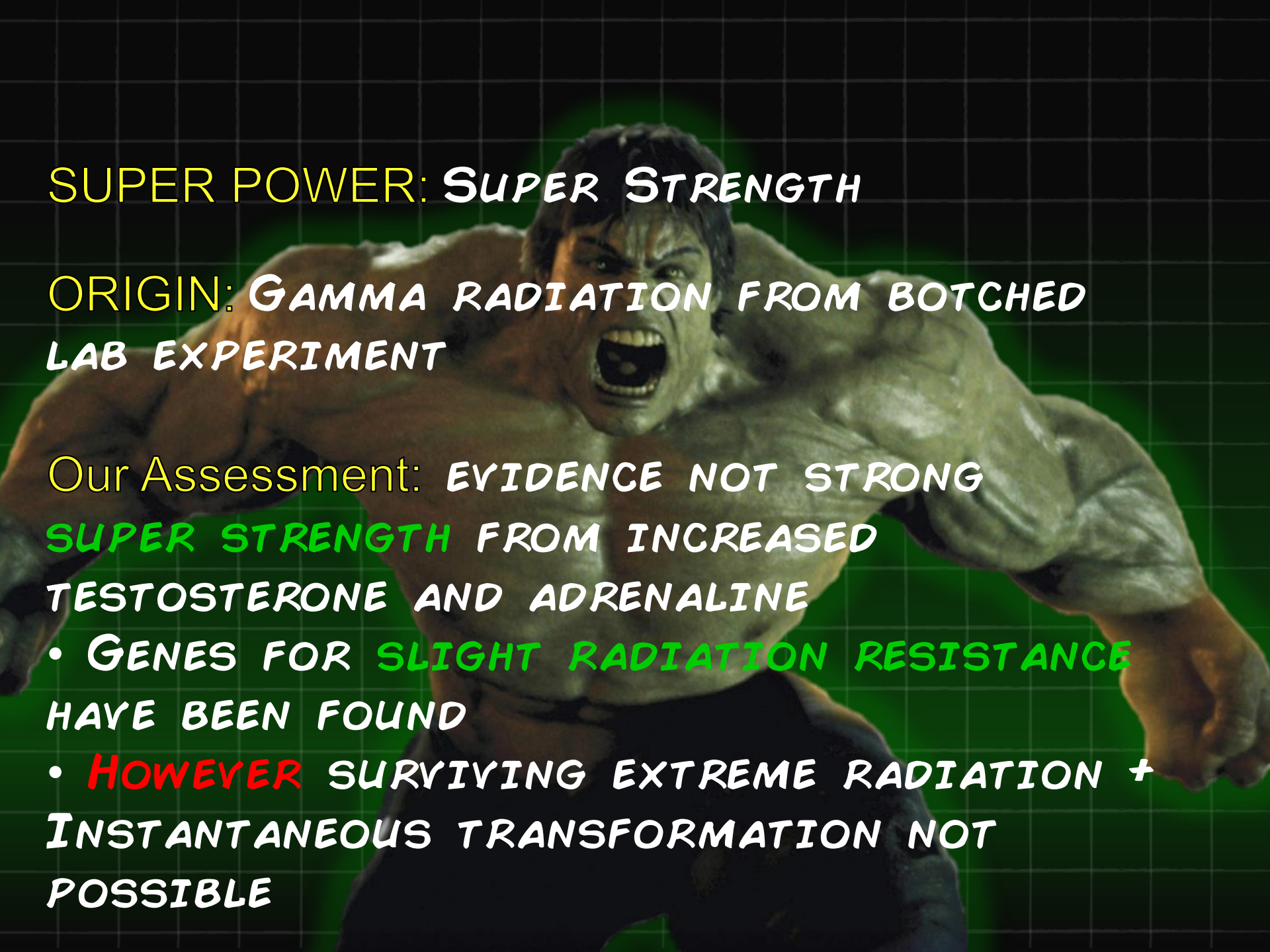


Super Power: SPINNING/SHOOTING WEBS

Origin: DNA INTEGRATION FROM SPIDER BITE

Our Assessment: DOESN'T QUITE STICK

- **MASP1** AND **MASP2** GENES: CAN PRODUCE SPIDER SILK PROTEINS
- SPINNING/SHOOTING WEBS REQUIRES EXTRA GLANDS AND GENES
- **DIFFICULT TO INTEGRATE** SO MANY GENES INTO HUMAN GENOME

The background of the slide features a close-up of the Hulk's face and upper torso. He has a green, muscular complexion and is shown in a roaring pose with his mouth wide open, revealing his teeth. The background behind him is a dark green grid pattern.

SUPER POWER: SUPER STRENGTH

**ORIGIN: GAMMA RADIATION FROM BOTCHED
LAB EXPERIMENT**

**Our Assessment: EVIDENCE NOT STRONG
SUPER STRENGTH FROM INCREASED
TESTOSTERONE AND ADRENALINE**

- **GENES FOR SLIGHT RADIATION RESISTANCE
HAVE BEEN FOUND**
- **HOWEVER SURVIVING EXTREME RADIATION +
INSTANTANEOUS TRANSFORMATION NOT
POSSIBLE**



Super Power: **SUPER SPEED**

Origin: **CHEMICAL BATH + LIGHTNING**

Our Assessment: **NOT SO FAST**

- **ACTN3** GENE + INCREASE IN **ADRENALINE** = INCREASED SPEED
- **DEFINITELY NOT AS FAST AS THE COMICS DEPICT HIM**
- **MAYBE USAIN BOLT** FAST



PROFESSOR X

Super Power: **ADVANCED
TELEPATHY**

Origin: **GENE X**



Our Assessment: **X-TRMELY UNLIKELY**

- **GENE X** TOO MANY FUNCTIONS TO BE REALISTIC
- **TELEPATHY** HAS NO REALISTIC BASIS, GENETIC OR OTHERWISE
- **STILL AWESOME**



THE WOLVERINE

Super Power: **SUPER REGENERATION**
AND RETRACTABLE CLAWS

Origin: **GENE X**

Our Assessment: **NOT LONG-LIVED**

- **REGENERATION MAY BE POSSIBLE BUT SPEEDY RATE UNLIKELY**
- **RETRACTABLE BONES: FOUND IN JAPANESE OTTON FROG**
- **NO KNOWN GENE FOR REGENERATION OR RETRACTABLE CLAWS**

Picture Citations

Spiderman Slide:

<http://static.comicvine.com/uploads/original/11115/111151582/3898714-2014-new-fashion-hot-sale-adult-spider-man-props-and-costumes-spiderman-halloween-costume-spider-man.jpg>
<http://sompredo.com/wp-content/uploads/2013/09/spider-that-bit-spiderman.jpg>
<http://www.nist.gov/oles/forensics/images/DNA-Strand.jpg>

Wolverine Slide:

<http://www.nist.gov/oles/forensics/images/DNA-Strand.jpg>
<http://www.thewolverinemovie.com/intl/img/content/background.jpg>
http://www.hdwpapers.com/the_wolverine_title_wallpaper-wallpapers.html

Professor X Slide:

<http://www.nist.gov/oles/forensics/images/DNA-Strand.jpg>
http://img1.wikia.nocookie.net/__cb20120329220336/weapon-x/de/images/b/be/Xmen_logo.jpg
<http://frenzia.com/x-men-days-of-future-past-old-charles-xavier-professor-x-wallpaper/>

Flash Slide:

<http://www.fightersgeneration.com/characters4/theflash.html>
http://media.cwtv.com/cwtv/digital-smiths/thumbs/2014/07/25/FLA-DontBlink-trlx-0728_b619377ff_CWtv_720x400.jpg
http://leveluprogueadvisor.files.wordpress.com/2013/05/the_flash_logo.jpg

Hulk Slide:

<http://www.centerforworklife.com/cfwl-content/uploads/2013/08/hulk1.jpg>
<http://www.herogohome.com/wp-content/uploads/2012/03/IncredibleHulkTitle.jpg>
<http://cdn.mos.totalfilm.com/images/h/hulk.jpg>

Captain America Slide:

<http://www.nist.gov/oles/forensics/images/DNA-Strand.jpg>
<http://images.fandango.com/images/fandangoblog/cappatriot1new.jpg>
http://disney.wikia.com/wiki/Captain_America/Gallery
<http://zekegaming.com/wp-content/uploads/2011/05/1.jpg>

UCSF_UC BERKELEY IGEM 2014 TEAM

